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United States
Department of
Agriculture

Soil
Conservation
Service

Spokane,
Washington



Washington Water Supply Outlook

February 1, 1986

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Foreword

How Forecasts Are Made

Most of the annual streamflow in the Western United States originates as snowfall. This snowfall accumulates high in the mountains during winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Predictions are based on careful measurements of snow water equivalent at selected index points. Precipitation, temperature, soil moisture and antecedent streamflow data are viewed in conjunction with snowpack data to prepare runoff forecasts. This report presents a comprehensive picture of water supply outlook conditions for areas dependent upon surface runoff. It includes selected streamflow forecasts, summarized snowpack and precipitation data, reservoir storage data and narratives describing current conditions.

Streamflow forecasts are cooperatively generated by Soil Conservation Service and National Weather Service hydrologists. Forecasts become more accurate as more data affecting runoff becomes known. For this reason, forecasts are issued that reflect three future precipitation conditions — Below Normal, Average, and Above Normal. These forecasts are termed reasonable minimum, most probable, and reasonable maximum. Actual streamflow can be expected to fall between the lower and upper forecast values eight out of ten years.

Snowpack data are obtained by using a combination of manual and automated measurement methods. Manual readings of snow depth and water equivalent are taken at locations called snow courses on a monthly or semi-monthly schedule during the winter. In addition, snow water equivalent, precipitation, temperature, and other parameters are monitored on a daily basis and transmitted via radio telemetry to central data collection facilities. Both monthly and daily data are used to project snowmelt runoff.

For More Information

Copies of Monthly Water Supply Outlook Reports and other reports may be obtained from the states listed below. Because of the limited space, snow survey measurements are not published in monthly reports. An annual snow survey data summary is published by the Soil Conservation Service for each of the western states. Historical snow survey data may be obtained at those same offices.

STATE	ADDRESS
Alaska	201 East 9th Ave., Suite 300, Anchorage, AK 99501-3687
Arizona	201 East Indianola, Suite 200, Phoenix, AZ 85012
Colorado (New Mexico)	2490 West 26th Ave., Denver, CO 80211
Idaho	304 North 8th Street, Room 345, Boise, ID 83702
Montana	10 East Babcock, Room 443, Federal Building, Bozeman, MT 59715
Nevada	50 South Virginia Street, Third Floor, Reno, NV 89505
Oregon	1220 Southwest 3rd Ave., 16th Floor, Portland, OR 97204
Utah	4402 Federal Building, 125 South State Street, Salt Lake City, UT 84147
Washington	360 U.S. Court House, Spokane, WA 99201
Wyoming	Federal Building, 100 East "B" Street, Casper, WY 82602

In addition to state reports, a Water Supply Outlook for the Western United States is published by the Soil Conservation Service and National Weather Service monthly, January through May. Reports may be obtained from the Soil Conservation Service, West National Technical Center, 511 Northwest Broadway, Room 547, Portland, OR 97209.

Published by other agencies:

Water Supply Outlook Reports prepared by other agencies include: California — Snow Survey Branch, California Department of Water Resources, P.O. Box 388, Sacramento, CA 98502; British Columbia — The Ministry of Environment, Water Investigations Branch, Parliament Buildings, Victoria, British Columbia, V8V 1X5; Yukon Territory — Department of Indian and Northern Affairs, Northern Operations Branch, 200 Range Road, Whitehorse, Yukon Territory, Y1A 3V1; Alberta, Saskatchewan, and N.W.T. — The Water Survey of Canada, Inland Waters Branch, 110-12 Avenue S.W., Calgary, Alberta, T3C 1A6.

Washington Water Supply Outlook

and

Federal — State — Private Cooperative Snow Surveys

Issued by

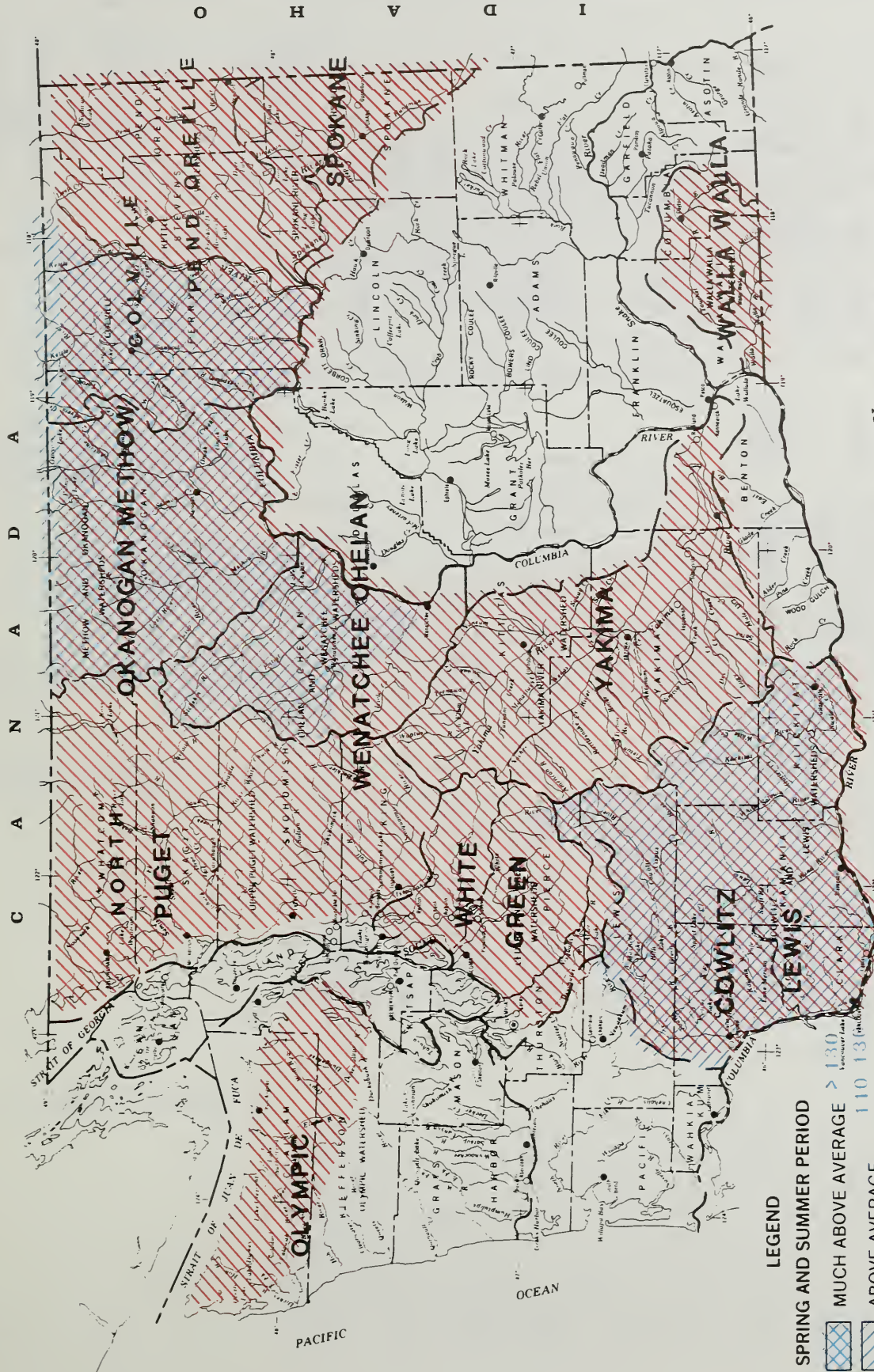
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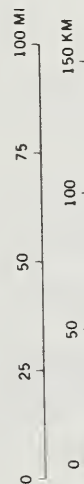
William F. Weller
Water Supply Specialist
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Spokane, Washington 99201



N FEBRUARY 1, 1986

STREAMFLOW PROSPECTS

WASHINGTON



INDEX to WASHINGTON SNOW COURSES, SOIL MOISTURE STATIONS and PRECIPITATION STORAGE GAGES

NAME	NUMBER	SEC.	TWP.	RANGE	ELEV.
UPPER COLUMBIA DRAINAGE					
Pend Oreille River					
Boyer Mountain	17A2	7	31N	43E	5250
Bunchgrass Meadow	17A1SP	24	37N	44E	5000
Kettle River					
Summit G. S.	18A7	20	39N	35E	4600
Butte Creek	18A3	28	39N	35E	4070
Goat Creek	18A4	26	39N	35E	3595
Spokane River					
Ragged Ridge	17B02	12	27N	45E	3333
Colville River					
Baird	17A6	19	36N	42E	3215
Stranger Mountain	17A5	26	31N	38E	4990
Chewelah	17A4	11	32N	41E	4925
Okanagan River					
Mutton Creek No. 1	19A1	30	37N	24E	5700
Mutton Creek No. 2	19A4	19	37N	24E	6000
Salmon Meadows	19A2SP	33	37N	24E	4500
Methaw River					
Harts Pass	20A5SP	7	37N	18E	6500
Chelan Lake Basin					
Lyman Lake	20A23SP	18	31N	16E	5900
Park Creek Ridge	20A12SP	18	34N	16E	4600
Rainy Pass	20A9SP	21	35N	17E	4780
Mirror Lake	20A39	30	31N	18E	5600
Entiat River					
Brief	20B19	34	28N	19E	1600
Entiat Meadows	20A33a	28	31N	17E	4540
Entiat River Trail	20A34a	2	29N	17E	3325
Fox Camp	20A36a	17	30N	18E	6510
Pope Ridge	20B20	22	29N	18E	3540
Pope Ridge Snow Pillow	20B24SP	22	29N	18E	3540
Pugh Ridge	20A32a	34	30N	18E	6725
Shady Pass	20A37	20	29N	19E	6200
Snow Brushy	20A35a	21	30N	17E	3910
Tommy Creek	20B21a	10	28N	18E	4900
Wenatchee River					
Berne-Mill Creek (New)	21B41SP	13	26N	14E	3240
Blewett Pass No. 2	20B2 SP	35	22N	17E	4270
Stevens Pass	21B1SP	14	26N	13E	4070
Trough #2	20B25SP	10	20N	20E	5310
Squilchuck Creek					
Beehive Springs	20B3	12	21N	19E	4400
Stemilt Creek					
Stemilt Slide	20B6	30	21N	20E	5000
Upper Wheeler	20B7SP	30	21N	20E	4400
Yakima River					
Ahtanum R. S.	21C11	24	12N	14E	3100
Big Boulder Creek	21B9SP	35	23N	14E	3200
Bumping Lake	21C8P	23	16N	12E	3450
Bumping Lake New	21C36	13	16N	12E	3400
Bumping Ridge	21C38SP	9	15N	12E	4600
Fish Lake	21B4SP	28	24N	14E	3371
Green Lake	21C10 SP	3	12N	13E	6000
Grouse Camp	20B11 SP	29	21N	19E	5385
Lake Cle Elum	21B14M	15	20N	14E	2200
Morse Lake	21C17SP	6	16N	11E	5400
Tunnel Avenue	21B8P	13	21N	11E	2450
White Pass (East Side)	21C28SP	2	13N	11E	4500

NAME	NUMBER	SEC.	TWP.	RANGE	ELEV.
LOWER COLUMBIA DRAINAGE					
Asotin Creek					
Spruce Springs	17C4	9	8N	40E	5700
Touchet River					
Touchet No. 2	17C5SP	6	7N	40E	5530
Lewis River					
June Lake	22C09SP	26	8N	5E	3200
Lane Pine Shelter	21C26SP	8	9N	7E	3800
Plains of Abraham	22C15P	35	9N	5E	4400
Spencer Meadow	21C20SP	16	8N	7E	3400
Surprise Lakes	21C13SP	14	7N	8E	4250
Cowlitz River					
Cayuse Pass	21C6	15	16N	10E	5300
Pigtail Peak	21C33SP	11	13N	11E	5900
Patata Hill	21C14SP	36	10N	10E	4500
Sheep Canyon	22C10SP	12	8N	4E	4050
Strawberry	22C08SP	9	10N	6E	3280

NAME	NUMBER	SEC.	TWP.	RANGE	ELEV.
PUGET SOUND DRAINAGE					
Nisqually River					
Paradise Park (New)	21C35 SP	13	15N	8E	5500
White River					
Corral Pass	21B13 SP	30	18N	11E	6000
Green River					
Airstrip	21B24P	18	20N	11E	1800
Charley Creek	21B25	27	21N	8E	1200
Caugar Mountain	21B42SP	21	21N	9E	3200
Grass Mountain No. 2	21B27	14	20N	8E	2900
Grass Mountain No. 3	21B28	12	20N	8E	2100
Lester Creek	21B29	36	20N	10E	3100
Lynn Lake	21B50	22	20N	8E	4000
Sawmill Ridge	21B31	5	19N	11E	4700
Stampede Pass	21B10 SP	25	21N	11E	3860
Twin Camp	21B30	18	19N	11E	4100
Cedar River					
City Cabin	21B3	10	21N	10E	2390
Mt. Gardner	21B21P	30	22N	10E	3300
Snoqualmie River					
Alpine Meadow	21B48	31	27N	9E	3500
Olallie Meadows	21B2P	19	22N	11E	3625
Olallie Meadows East	21B55SP	20	22N	11E	3700
Skagit River					
Beaver Creek Trail	21A4	35	39N	12E	2200
Beaver Pass	21A1	9	39N	12E	3680
Brown Top	21A28a	26	40N	12E	6000
Devils Park	20A4	34	38N	16E	5900
Freezeout Creek Trail	20A1	14	40N	14E	3500
Freezeout Meadows (New)	20A38	8	40N	16E	5000
Granite Creek	20A06	25	36N	16E	3500
Meadows Cabins	20A8	29	36N	14E	1900
New Hazomeen Lake	21A30	19	40N	14E	2800
Thunder Basin	20A07	10	35N	14E	4200

NAME	NUMBER	SEC.	TWP.	RANGE	ELEV.
Baker River					
Dock Butte	21A11A	8	36N	8E	3800
Easy Pass	21A7A	19	39N	11E	5200
Jasper Pass	21A6A	17	38N	11E	5400
Marten Lake	21A9A	23	38N	8E	3600
Mount Blum	21A18a	27	38N	10E	5800
Racky Creek	21A12AP	20	37N	8E	2100
Schreibers Meadow	21A10AP	18	37N	8E	3400
S. F. Thunder Creek	21A14A	20	36N	9E	2200
Sulphur Creek	21A13	22	37N	8E	1600
Three Mile Creek	21A15	18	36N	9E	1600
Watson Lakes	21A8P	25	37N	9E	4500

NAME	NUMBER	SEC.	TWP.	RANGE	ELEV.
OLYMPIC PENINSULA					
Dungeness River					
Deer Park	23B4	1	28N	5W	5200
Elwha River					
Hurricane	23B3	36	29N	7W	4500
Cox Valley	23B14	31	29N	6W	4500

LEGEND	
21A7	Snow Course Only
21A7a	Aerial Marker Only
21A7A	Snow Course And Aerial Marker
21A7M	Snow Course And Soil Moisture Station
21A7m	Soil Moisture Station
21A7P	Snow Course And Precipitation Storage Gage
21A7p	Precipitation Storage Gage
21A7SP	Snow Pillow

GENERAL OUTLOOK

SUMMARY:

The February 1 snowpack is below average for the west slope of the Cascade Mountains of Washington and the extreme eastern portion of the state. Snowcover is near or above average for the east slopes of the Cascade mountains. Streamflows continued to be below average for January, while precipitation was above average. Forecasted streamflows vary from near average to below average. In the below average are Olympics 74%, Green 76%, Spokane 75% and the Pend Oreille at 85%.

SNOWPACK:

Snowpack in Washington varied greatly with 60% of normal in the Elwah and Green River basins to 138% of average in the Squilchuck Basin above Wenatchee. Snow surveys taken in other areas of the state show the following snow cover; Spokane and Pend Oreille 71%, Cowlitz 82%, and the Skagit 90%, Okanogan 112%, Wenatchee 86%, Yakima 90%, Walla Walla 81%, Cowlitz 82% and the Skagit 90%.

PRECIPITATION:

Precipitation was above normal over most of Washington during January. Extremely heavy rainfall occurred January 18 with some stations reporting new record maximum 24 hour precipitation rates. The northwest slopes of the Cascades were 100% of average while the south west slope were at 97%. The eastern slopes of the Cascades were 107% of average and the northeast area of Washington was 141% of normal for January.

RESERVOIRS:

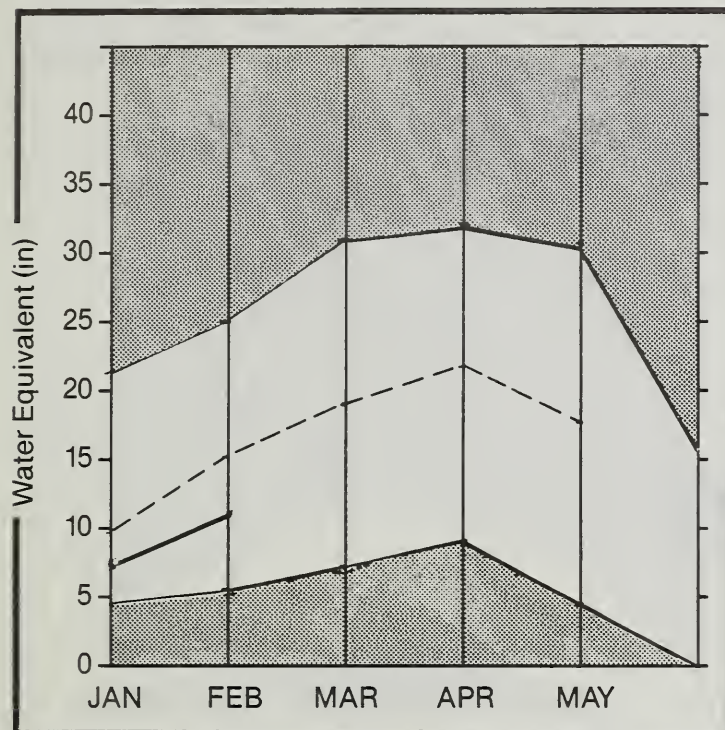
Reservoir storage continued below normal for January. Storage in the Yakima Basin as reported by the Bureau of Reclamation was 441,000 acre feet or 61% of the normal February 1 storage. Irrigation reservoirs in the Okanogan area were at 76% of normal storage. Power storage reservoirs at Chelan are at 60% and Coeur d' Alene is at 25% of normal. Reservoir storage is still showing the effects of a cold, dry December and January.

STREAMFLOW:





January streamflow was below normal. The western side of the state had 80% of normal runoff on the Cowlitz River, 99% on the Chehalis, and 93% on the Skykomish River. The eastern slope of the Cascades had 81% of normal runoff from Lake Chelan, 69% from the Wenatchee River, and 40% from the Yakima River. Flows from the Columbia River at the international boundary were 90% of the January normal and 82% at The Dalles. The Spokane River was 49% of normal and the Pend Oreille River was at 84%.

SPOKANE

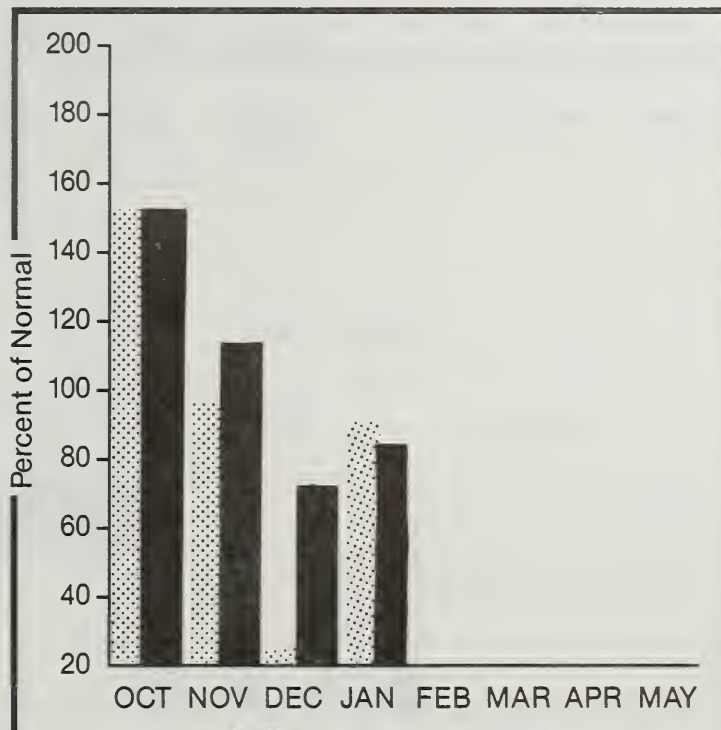
Mountain snowpack* (inches)





*Based on selected stations

Maximum  Average 
 Minimum  Current 

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation  Year to date precipitation 

SPOKANE RIVER BASIN

WATER SUPPLY OUTLOOK:

The forecasted streamflows show no improvement for February 1, with 75% of average for the Spokane River. Precipitation was 91% of the January normal, reducing the water year total to 82% of average. Streamflow for the Spokane River is reported to be 49% of normal for January. Spokane temperatures were 4 degrees above normal for January. Storage in Coeur d' Alene Lake is 25% of average. Snowpack for the Basin was 69% of normal for February first.

For more information contact your local Soil Conservation Service office.

SPOKANE RIVER BASIN

STREAMFLOW FORECASTS

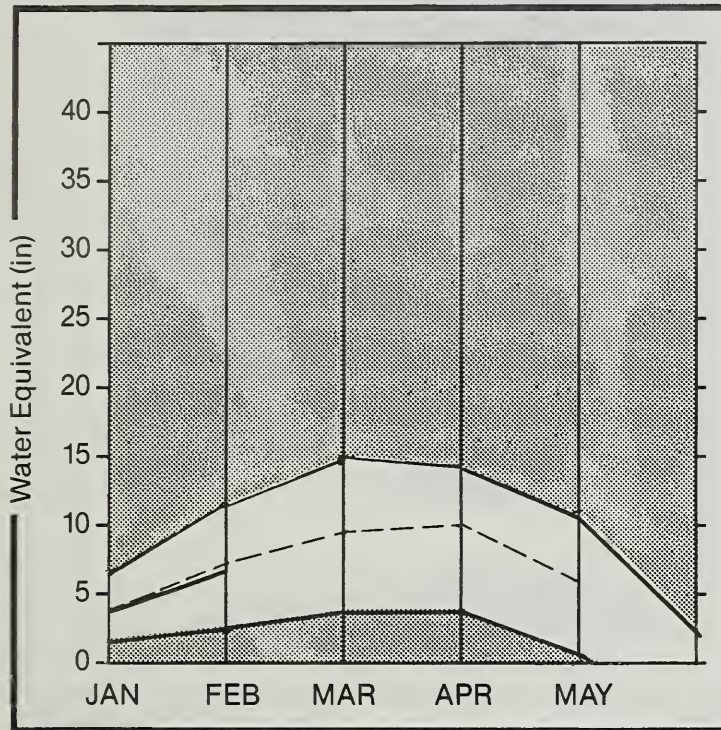
FORECAST POINT	FORECAST PERIOD	20 YR. AVE. (1000AF)	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVE.)	REAS. MAX. (% AVE.)	REAS. MIN. (% AVE.)	PEAK FLOW (CFS)	PEAK DATE	LOW FLOW (CFS)	LOW DATE
SPOKANE at Post Falls	APR-SEP	2848.0	2160.0	75	112	40				
	APR-JUL	2754.0	2090.0	75	112	40				

RESERVOIR STORAGE		(1000AF)			WATERSHED SNOWPACK ANALYSIS			
RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE **			WATERSHED	NO. COURSES AVE.D	THIS YEAR AS % OF	
		THIS YEAR	LAST YEAR	AVE.			LAST YR.	AVERAGE
COEUR D'ALENE	225.1	59.2	31.3	142.4	Spokane River	12	60	69

*Corrected for upstream diversions or changes in reservoir storage.
Average is for 1961-80 period.

COLVILLE AND PEND OREILLE

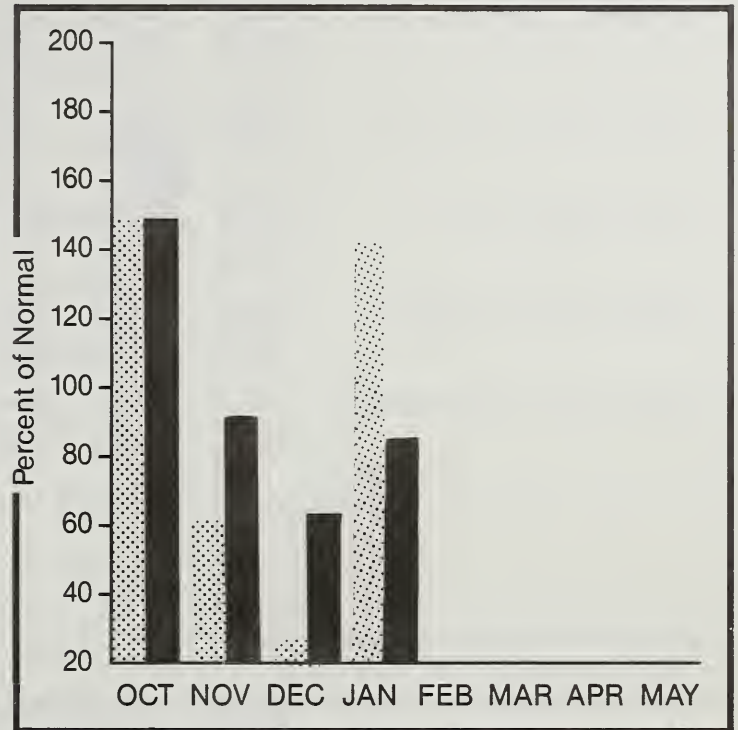
Mountain snowpack* (inches)




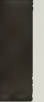
*Based on selected stations

Maximum  Average 
 Minimum  Current 

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation  Year to date precipitation 

COLVILLE - PEND OREILLE RIVER BASINS

WATER SUPPLY OUTLOOK:

Forecasted stream flows vary over the basin, with 78% predicted for the Pend Oreille River, 100% on the Kettle River and 85% on the Colville River. Temperatures were 5 degrees above average for January while precipitation was 145% of the January normal. The above average precipitation raised the water year total to 84% of normal. January streamflows were 84% of average on the Pend Oreille, while the Kettle gage was iced in. Snowpack varied from 70% of normal on the Pend Oreille to 95% on the Kettle River.

For more information contact your local Soil Conservation Service office.

STREAMFLOW FORECASTS

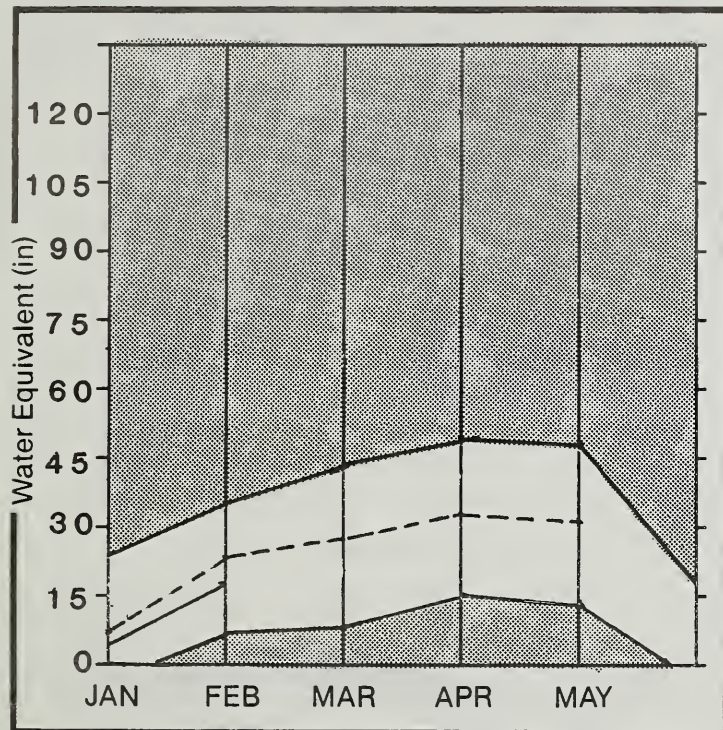
FORECAST POINT	FORECAST PERIOD	20 YR. AVE. (1000AF)	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVE.)	REAS. MAX. (% AVE.)	REAS. MIN. (% AVE.)	PEAK FLOW (CFS)	PEAK DATE	LOW FLOW (CFS)	LOW DATE
PEND OREILLE RIVER bl Box Canyon	APR-SEP	15425.0	12000.0	77	100	56				
	APR-JUL	14156.0	11000.0	77	100	56				
	APR-JUN	12227.0	9540.0	78	100	56				
COLVILLE RIVER at Kettle Falls	APR-SEP	134.0	114.0	85	135	35				
	APR-JUL	123.0	104.0	84	135	35				
	APR-JUN	114.0	96.0	84	134	34				
KETTLE RIVER nr Laurier	APR-SEP	1829.0	1830.0	100	139	61				
	APR-JUL	1738.0	1740.0	100	139	61				
	APR-JUN	1581.0	1580.0	99	139	61				
COLUMBIA RIVER at Birchbank *	APR-SEP	44605.0	42600.0	95	116	76				
	APR-JUL	35705.0	34100.0	95	116	76				
	APR-JUN	26027.0	24700.0	94	115	75				
COLUMBIA RIVER at Grand Coulee *	APR-SEP	66841.0	60600.0	90	108	74				
	APR-JUL	56169.0	50900.0	90	108	74				
	APR-JUN	44036.0	40100.0	91	108	74				

RESERVOIR STORAGE (1000AF)					WATERSHED SNOWPACK ANALYSIS			
RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE **			WATERSHED	NO. COURSES AVE.D	THIS YEAR AS % OF	
		THIS YEAR	LAST YEAR	AVE.			LAST YR.	AVERAGE
ROOSEVELT	5232.0	5014.1	4224.7	3749.0	Colville River	0	0	0
BANKS	715.0	391.0	774.8	599.0	Pend Oreille River	9	63	70
					Kettle River	6	93	91
					Omac Lake, Twin Lakes	0	0	0
					Newman Lake	0	0	0

*Corrected for upstream diversions or changes in reservoir storage.
Average is for 1961-80 period.

OKANOGAN AND METHOW

Mountain snowpack* (inches)



*Based on selected stations

Maximum



Average



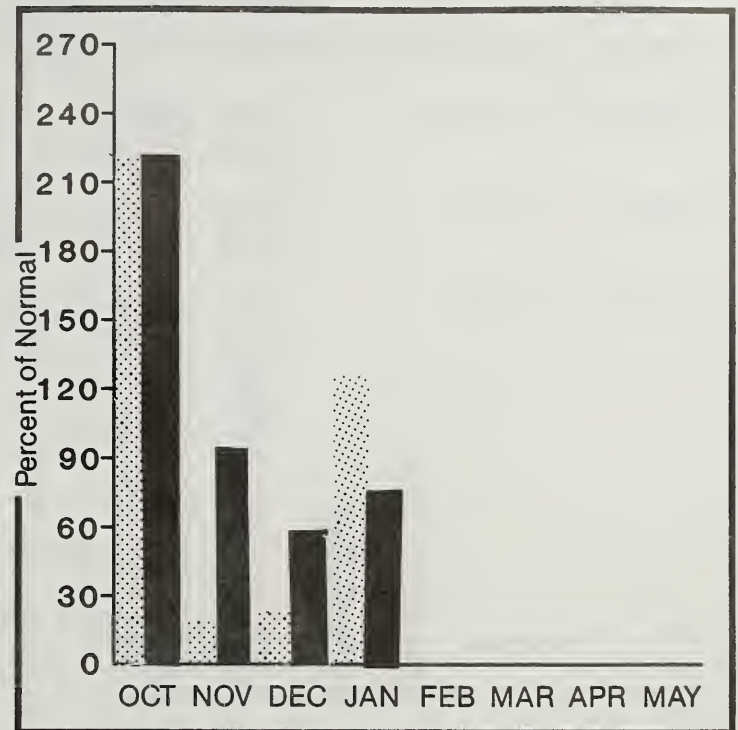
Minimum



Current



Precipitation* (percent of normal)

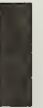


*Based on selected stations

Monthly precipitation



Year to date precipitation



OKANOGAN - METHOW RIVER BASINS

WATER SUPPLY OUTLOOK:

Snowpack on the Okanogan Basin showed improvement in the Canadian portion of the watershed with 112% of February 1 average. The U.S. snow courses were 76% of average. The snow covering the Methow is at 84 % of normal. Forecasted streamflows are 93% on the Okanogan and 94% on the Methow River. January precipitation was 123% of normal raising the water year total to 75% of average. Stream gages were iced in on the Okanogan River. Temperatures averaged 6 degrees above normal. Reservoir storage was 76% of

For more information contact your local Soil Conservation Service office.

OKANOGAN - METHOW RIVER BASINS

STREAMFLOW FORECASTS

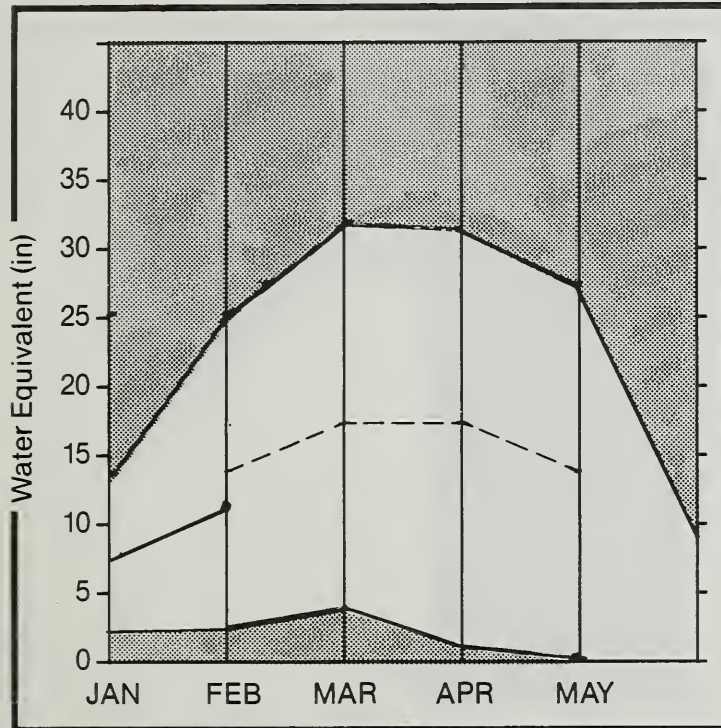
FORECAST POINT	FORECAST PERIOD	20 YR. AVE. (1000AF)	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVE.)	REAS. MAX. (% AVE.)	REAS. MIN. (% AVE.)	PEAK FLOW (CFS)	PEAK DATE	LOW FLOW (CFS)	LOW DATE
SIMILKAMEEN R. nr Nighthawk	APR-SEP	1462.0	1370.0	93	146	42				
	APR-JUL	1365.0	1280.0	93	146	42				
	APR-JUN	1161.0	1090.0	93	146	42				
OKANOGAN R. nr Tonasket	APR-SEP	1644.0	1540.0	93	148	40				
	APR-JUL	1497.0	1400.0	93	147	40				
	APR-JUN	1262.0	1180.0	93	147	40				
METHOW RIVER nr Pateros	APR-SEP	980.0	930.0	94	126	64				
	APR-JUL	908.0	860.0	94	126	64				
	APR-JUN	773.0	734.0	94	126	64				

RESERVOIR STORAGE (1000AF)					WATERSHED SNOWPACK ANALYSIS			
RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVE.	WATERSHED	NO. COURSES AVER.D	THIS YEAR AS % OF LAST YR.	% OF AVERAGE
					Okanogan River	22	90	87
					Methow River	2	81	84

*Corrected for upstream diversions or changes in reservoir storage.
Average is for 1961-80 period.

WENATCHEE AND CHELAN

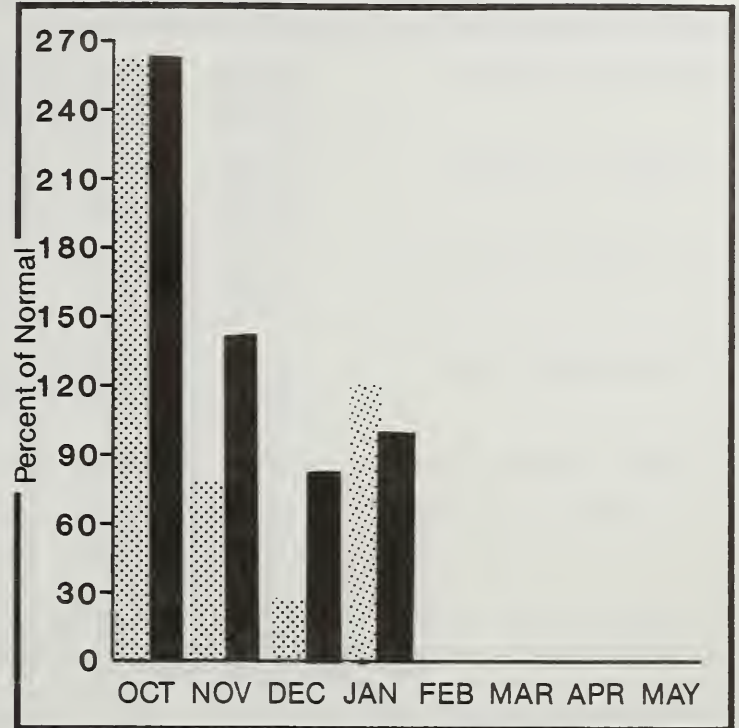
Mountain snowpack* (inches)





*Based on selected stations

Maximum  Average 
Minimum  Current 

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation  Year to date precipitation 

WENATCHEE - CHELAN RIVER BASINS

WATER SUPPLY OUTLOOK:

The percent snow cover increased over the basin improving from the January 1st readings on the Chelan from 75% to 107%, and on the Wenatchee from 74% to 86%. Forecasted streamflow for the April-September period are for 94% on the Chelan, 94% on the Wenatchee, 93% on the Entiat and 94% on the Stimelt. Precipitation was 120% of average for January bringing the water year total to 96% of normal. Streamflows were 81% on the Chelan and 69% on the Wenatchee River. Storage in the Chelan was 60%.

For more information contact your local Soil Conservation Service office.

WENATCHEE - CHELAN RIVER BASINS

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	20 YR. AVE. (1000AF)	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVE.)	REAS. MAX. (% AVE.)	REAS. MIN. (% AVE.)	PEAK FLOW (CFS)	PEAK DATE	LOW FLOW (CFS)	LOW DATE
CHELAN RIVER at Chelan *	APR-SEP	1203.0	1142.0	94	120	70				
	APR-JUL	1055.0	1000.0	94	120	70				
	APR-JUN	826.0	780.0	94	119	69				
STEHEKIN R. at Stehakin	APR-SEP	860.0	840.0	97	118	78				
	APR-JUL	727.0	710.0	97	118	78				
	APR-JUN	553.0	540.0	97	118	78				
ENTIAT RIVER nr Ardenvoir	APR-SEP	234.6	220.0	93						
	APR-JUL	213.0	200.0	93						
	APR-JUN	172.0	160.0	93						
WENATCHEE RIVER at Plain	APR-SEP	1270.0	1200.0	94	120	70				
	APR-JUL	1113.0	1050.0	94	128	60				
	APR-JUN	899.0	850.0	94	129	61				
STEMILT nr Wenatchee (miners in)	MAY-SEP	138.0	131.0	94						
ICICLE CREEK nr Leavenworth	APR-SEP	370.0	330.0	89						
	APR-JUL	340.0	300.0	88						
	APR-JUN	270.0	240.0	88						
COLUMBIA R. bl Rock Island Dam *	APR-SEP	72781.0	67000.0	92	110	74				
	APR-JUL	61601.0	56700.0	92	110	74				
	APR-JUN	48384.0	44500.0	92	110	74				

RESERVOIR STORAGE

(1000AF)

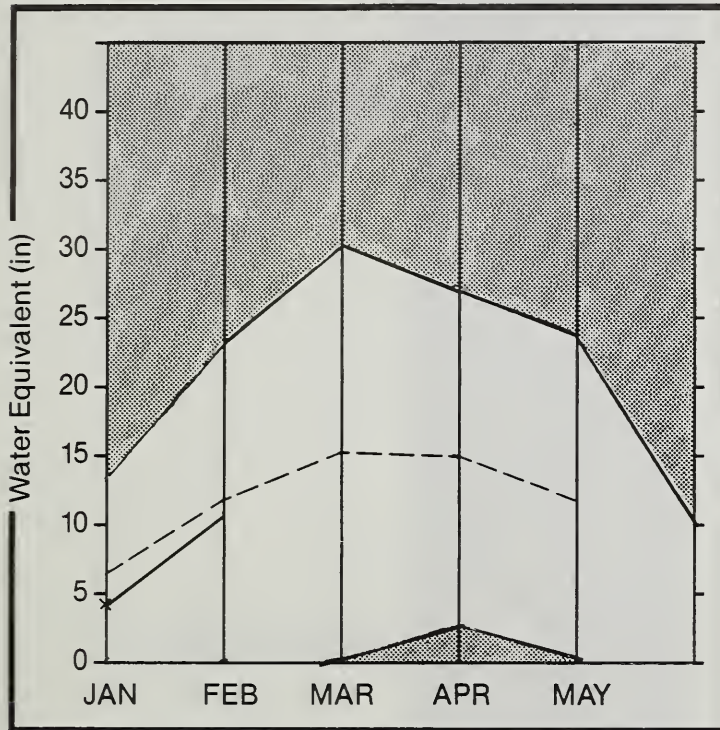
WATERSHED SNOWPACK ANALYSIS

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE **			WATERSHED	NO. COURSES AVE.D	THIS YEAR AS % OF	
		THIS YEAR	LAST YEAR	AVE.			LAST YR.	AVERAGE
CHELAN LAKE	576.1	267.5	226.9	250.8	Chelan Lake Basin	3	108	107
					Entiat River	2	140	102
					Wenatchee River	7	83	86
					Colockum Creek	1	109	118
					Squilchuck Creek	1	191	138
					Stemilt Creek	1	135	105



*Corrected for upstream diversions or changes in reservoir storage.
Average is for 1961-80 period.

YAKIMA

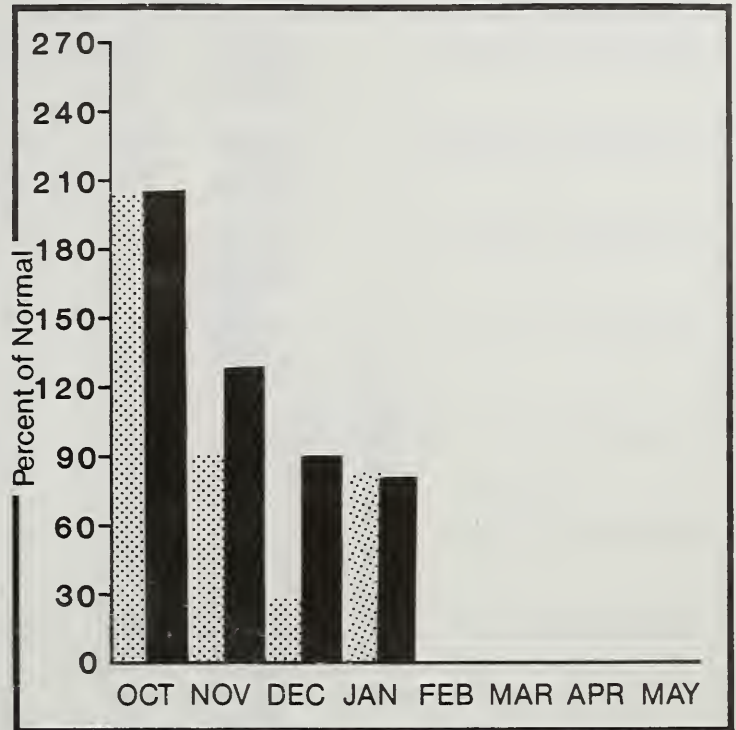
Mountain snowpack* (inches)





*Based on selected stations

Maximum  Average 
Minimum  Current 

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation  Year to date precipitation 

YAKIMA RIVER BASIN

WATER SUPPLY OUTLOOK:

Snow cover improved in the Yakima Basin to 90% of average. Streamflow forecasted for the basin include 89% for the Yakima River at Martin, 90% on the Naches, 90% on the Tieton and 88% on the Ahtanum. Reservoir storage showed minor improvement, but remained at 61% of normal with 441,000 acre feet impounded. January precipitation was 86% of normal with temperatures 2 degrees above average. Streamflow was 40% of normal on the Yakima River.

For more information contact your local Soil Conservation Service office.

YAKIMA RIVER BASIN

STREAMFLOW FORECASTS

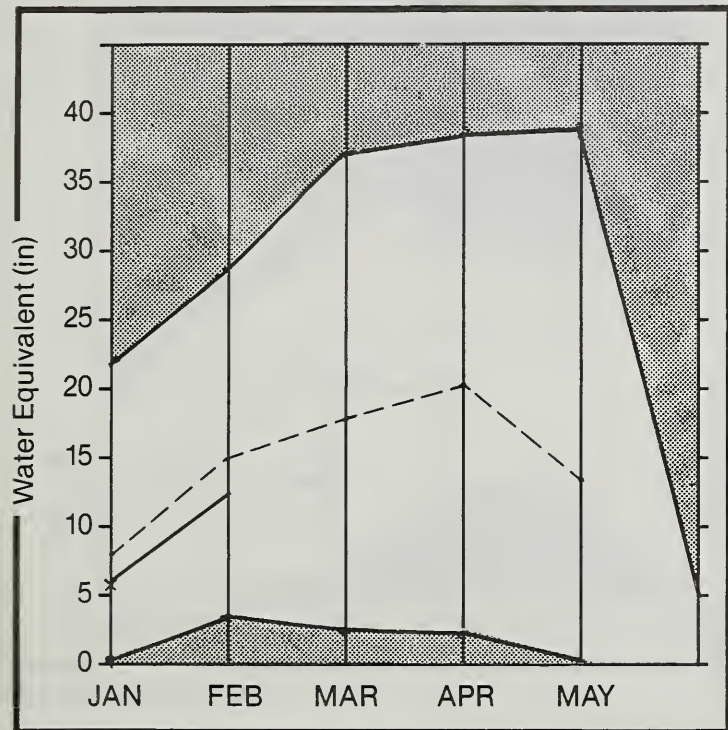
FORECAST POINT	FORECAST PERIOD	20 YR. AVE. (1000AF)	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVE.)	REAS. MAX. (% AVE.)	REAS. MIN. (% AVE.)	PEAK FLOW (CFS)	PEAK DATE	LOW FLOW (CFS)	LOW DATE
YAKIMA RIVER at Martin *	APR-SEP	139.0	125.0	89	106	74				
	APR-JUL	128.0	115.0	89	105	74				
	APR-JUN	111.0	100.0	90	106	74				
YAKIMA RIVER at Cle Elum *	APR-SEP	943.0	785.0	83	96	70				
	APR-JUL	854.0	711.0	83	96	70				
	APR-JUN	734.0	609.0	82	96	70				
YAKIMA RIVER nr Parker *	APR-SEP	2096.0	1760.0	83	106	62				
	APR-JUL	1898.0	1590.0	83	106	62				
	APR-JUN	1667.0	1400.0	83	106	62				
KACHESS RIVER nr Easton *	APR-SEP	121.0	110.0	90	105	77				
	APR-JUL	115.0	100.0	86	101	73				
	APR-JUN	101.0	90.0	89	103	75				
CLE ELUM RIVER nr Roslyn *	APR-SEP	463.0	420.0	90	103	79				
	APR-JUL	422.0	380.0	90	102	78				
	APR-JUN	353.0	320.0	90	103	79				
BUMPING RIVER nr Nile *	APR-SEP	142.0	126.0	88	115	63				
	APR-JUL	129.0	114.0	88	113	62				
	APR-JUN	107.0	95.0	88	113	63				
AMERICAN RIVER nr Nile	APR-SEP	124.0	110.0	88	114	64				
	APR-JUL	113.0	100.0	88	113	64				
	APR-JUN	94.0	85.0	90	116	66				
TIETON RIVER at Tieton *	APR-SEP	246.0	221.0	89	115	65				
	APR-JUL	207.0	190.0	91	117	67				
	APR-JUN	165.0	150.0	90	111	69				
NACHES RIVER nr Naches *	APR-SEP	867.0	751.0	86	115	59				
	APR-JUL	784.0	679.0	86	115	59				
	APR-JUN	667.0	580.0	86	115	59				
AHTANUM CREEK nr Tappico *	APR-SEP	47.0	41.0	87	128	47				
	APR-JUL	43.0	38.0	88	128	49				
	APR-JUN	37.0	33.0	89	130	49				

RESERVOIR STORAGE (1000AF)					WATERSHED SNOWPACK ANALYSIS		
RESERVOIR	USEABLE CAPACITY	XX USEABLE STORAGE THIS YEAR	XX USEABLE STORAGE LAST YEAR	XX AVE.	WATERSHED	NO. COURSES AVE.D	THIS YEAR AS % OF LAST YR. AVERAGE
KEECHELUS	157.8	62.4	83.3	96.0	Yakima River	15	110 90
KACHESS	239.0	107.0	149.0	170.0	Ahtanum Creek	2	130 81
CLE ELEM	436.9	129.4	175.8	251.0			
BUMPING LAKE	33.7	8.2	3.8	9.0			
RIMROCK	198.0	129.5	92.1	115.0			





*Corrected for upstream diversions or changes in reservoir storage.
Average is for 1961-80 period.

WALLA WALLA

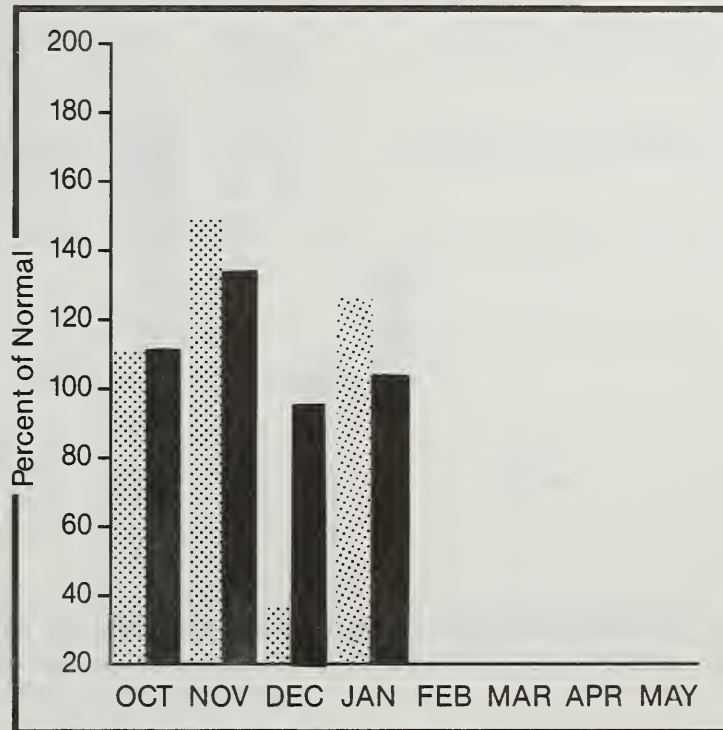
Mountain snowpack* (inches)




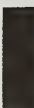
*Based on selected stations

Maximum  Average 
 Minimum  Current 

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation  Year to date precipitation 

WALLA WALLA RIVER BASIN

WATER SUPPLY OUTLOOK:

Streamflows are expected to be 88% of normal in the Walla Walla River during the spring and summer. January streamflow was at 65% of average. Snow cover is 81% if normal for the February 1 readings. Temperatures in the basins were 7 degrees above normal during January.

For more information contact your local Soil Conservation Service office.

WALLA WALLA RIVER BASIN

STREAMFLOW FORECASTS

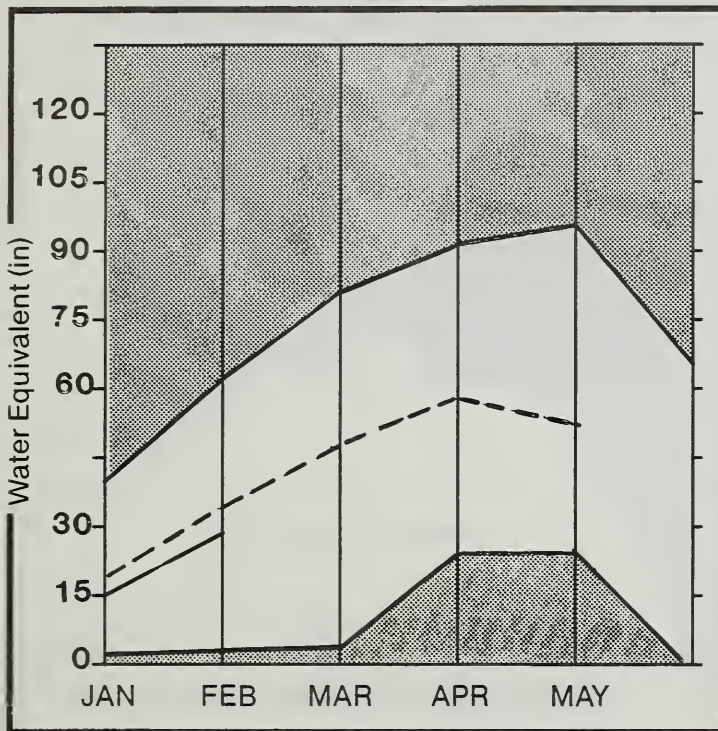
FORECAST POINT	FORECAST PERIOD	20 YR. AVE. (1000AF)	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVE.)	REAS. MAX. (% AVE.)	REAS. MIN. (% AVE.)	PEAK FLOW (CFS)	PEAK DATE	LOW FLOW (CFS)	LOW DATE
MILL CREEK at Walla Walla	APR-SEP	17.5	15.1	86	120	51				
	APR-JUL	17.3	14.8	85	121	52				
	APR-JUN	17.1	14.7	85	122	52				
COLUMBIA R. at The Dalles *	APR-SEP	101000.0	88400.0	88	108	48				
	APR-JUL	86500.0	75700.0	88	108	68				
	APR-JUN	70100.0	61700.0	88	108	48				

RESERVOIR STORAGE		(1000AF)	WATERSHED SNOWPACK ANALYSIS			
RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE **	WATERSHED	NO. COURSES AVE.D	THIS YEAR AS % OF	
	THIS YEAR	LAST YEAR AVE.			LAST YR.	AVERAGE
			Mill Creek	1	44	81





*Corrected for upstream diversions or changes in reservoir storage.
Average is for 1961-80 period.

COWLITZ AND LEWIS

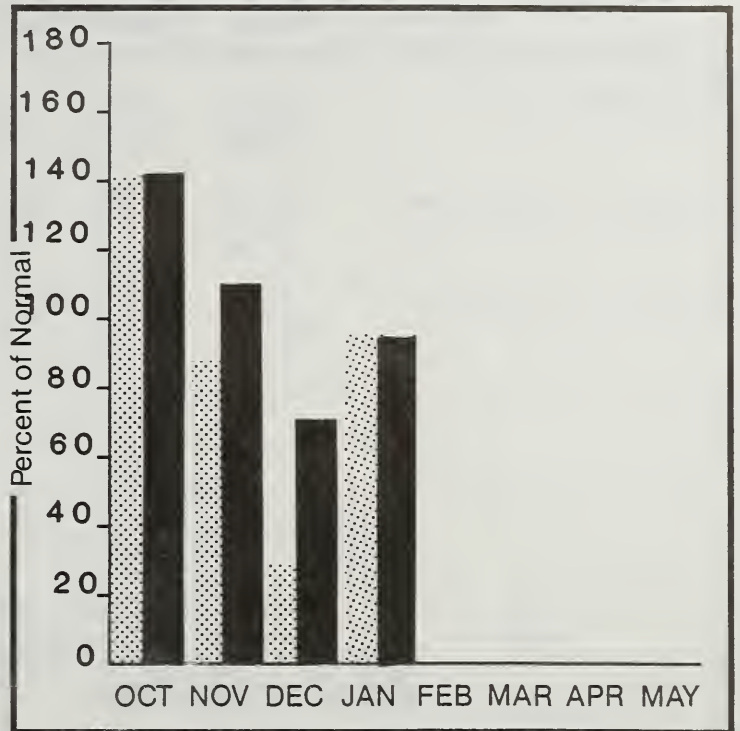
Mountain snowpack* (inches)





*Based on selected stations

Maximum  Average 
Minimum  Current 

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation  Year to date precipitation 

COWLITZ - LEWIS RIVER BASINS

WATER SUPPLY OUTLOOK:

Streamflow was 80% of January average on the Cowlitz River. Forecasted streamflow are 89% on the Cowlitz and 90% on the Lewis River for the April-September period. Precipitation remained below average in this basin with January having 94% of normal. Temperatures were 4 degrees above average for January. Snow cover in the Cowlitz River Basin was 82% of average and 94% on the Lewis River.

For more information contact your local Soil Conservation Service office.

COWLITZ - LEWIS RIVER BASINS

STREAMFLOW FORECASTS

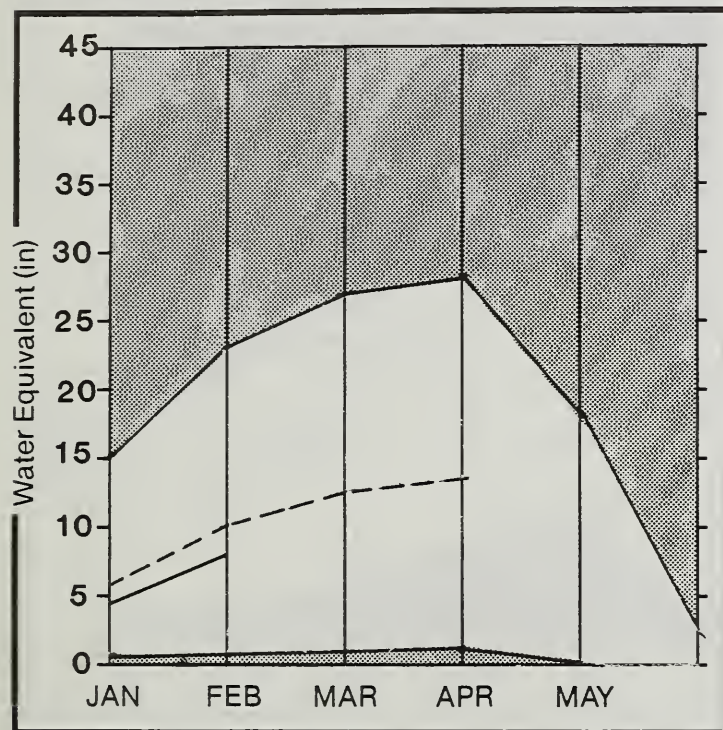
FORECAST POINT	FORECAST PERIOD	20 YR. AVE. (1000AF)	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVE.)	REAS. MAX. (% AVE.)	REAS. MIN. (% AVE.)	PEAK FLOW (CFS)	PEAK DATE	LOW FLOW (CFS)	LOW DATE
LEWIS RIVER at Ariel *	APR-SEP	1249.0	1120.0	89	127	53				
	APR-JUL	1086.0	980.0	90	127	53				
	APR-JUN	961.0	860.0	89	127	52				
COWLITZ R. bl Mayfield Dam *	APR-SEP	2038.0	1830.0	89	131	49				
	APR-JUL	1778.0	1600.0	89	131	49				
	APR-JUN	1502.0	1350.0	89	131	49				
COWLITZ R. at Castle Rock *	APR-SEP	2673.0	2430.0	90	124	58				
	APR-JUL	2323.0	2110.0	90	124	58				
	APR-JUN	1980.0	1800.0	90	124	58				

RESERVOIR STORAGE		(1000AF)	WATERSHED SNOWPACK ANALYSIS			
RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE **	WATERSHED	NO. COURSES AVE.D	THIS YEAR AS % OF	
	THIS YEAR	LAST YEAR AVE.			LAST YR.	AVERAGE
			Cowlitz River	1	85	82
			Lewis River	4	83	94





*Corrected for upstream diversions or changes in reservoir storage.
Average is for 1961-80 period.

WHITE - GREEN

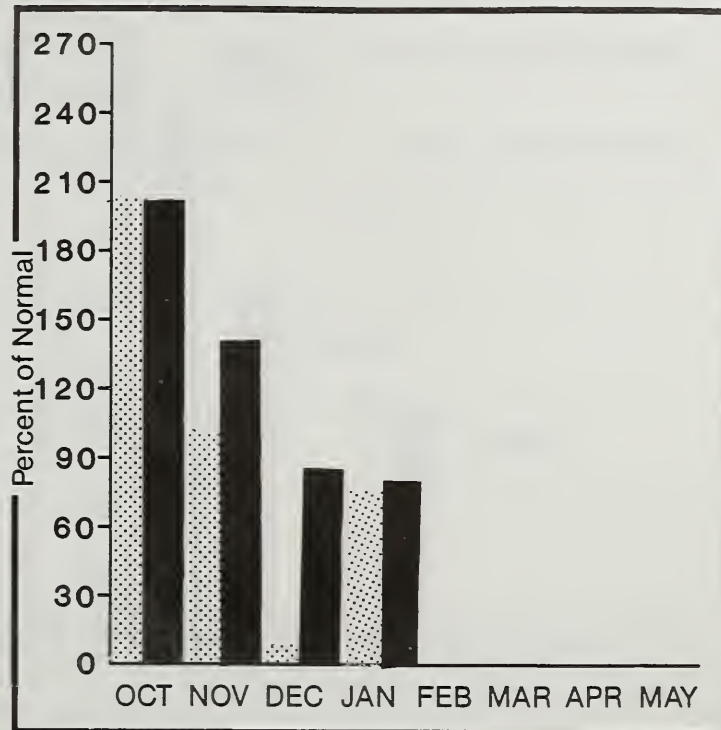
Mountain snowpack* (inches)





*Based on selected stations

Maximum  Average 
Minimum  Current 

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation  Year to date precipitation 

WHITE - GREEN RIVER BASINS

WATER SUPPLY OUTLOOK:

Snow cover on the Green River Basin was at 61% of normal for the February 1st snow survey. Streamflows are forecasted to be 76% of normal for the April-September period. Temperatures averaged 6 degrees above normal for January. Streamflows were near average for January with precipitation at 71% of normal. The water year precipitation is at 81% of average. Heavy rain on January 18 established new 24 hour precipitation records at some recording stations, and caused some local flooding.

For more information contact your local Soil Conservation Service office.

WHITE - GREEN RIVER BASINS

STREAMFLOW FORECASTS

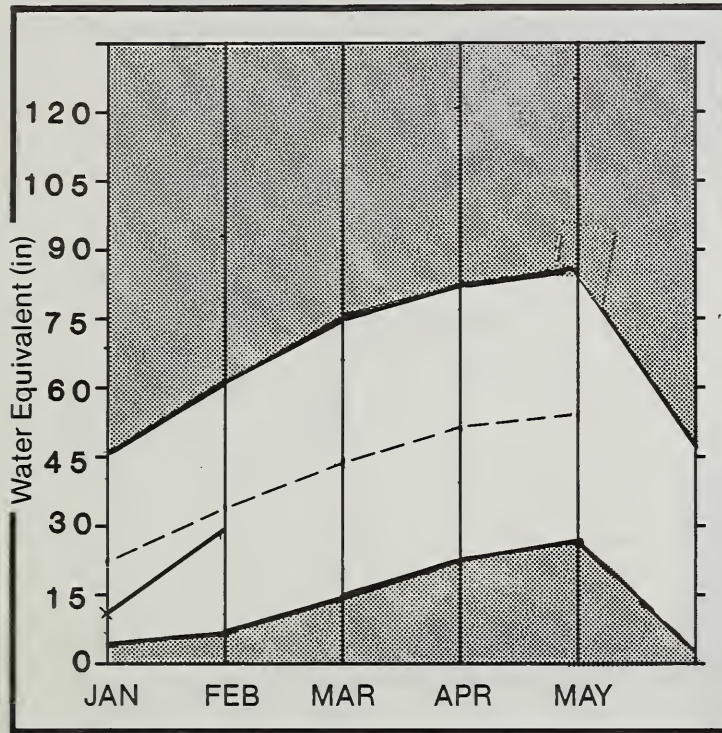
FORECAST POINT	FORECAST PERIOD	20 YR. AVE. (1000AF)	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVE.)	REAS. MAX. (% AVE.)	REAS. MIN. (% AVE.)	PEAK FLOW (CFS)	PEAK DATE	LOW FLOW (CFS)	LOW DATE
GREEN RIVER bl Howard Hanson Dam *	APR-SEP	316.0	246.0	77						
	APR-JUL	284.0	218.0	76						
	APR-JUN	256.0	190.0	74						
CEDAR RIVER nr Cedar Falls	APR-SEP	93.0	84.0	90						

RESERVOIR STORAGE (1000AF)					WATERSHED SNOWPACK ANALYSIS			
RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE **			WATERSHED	NO. COURSES AVE.D	THIS YEAR AS % OF	
		THIS YEAR	LAST YEAR	AVE.			LAST YR.	AVERAGE
					White River	2	111	84
					Green River	9	50	61

*Corrected for upstream diversions or changes in reservoir storage.
Average is for 1961-80 period.

NORTH PUGET SOUND

Mountain snowpack* (inches)



*Based on selected stations

Maximum



Average



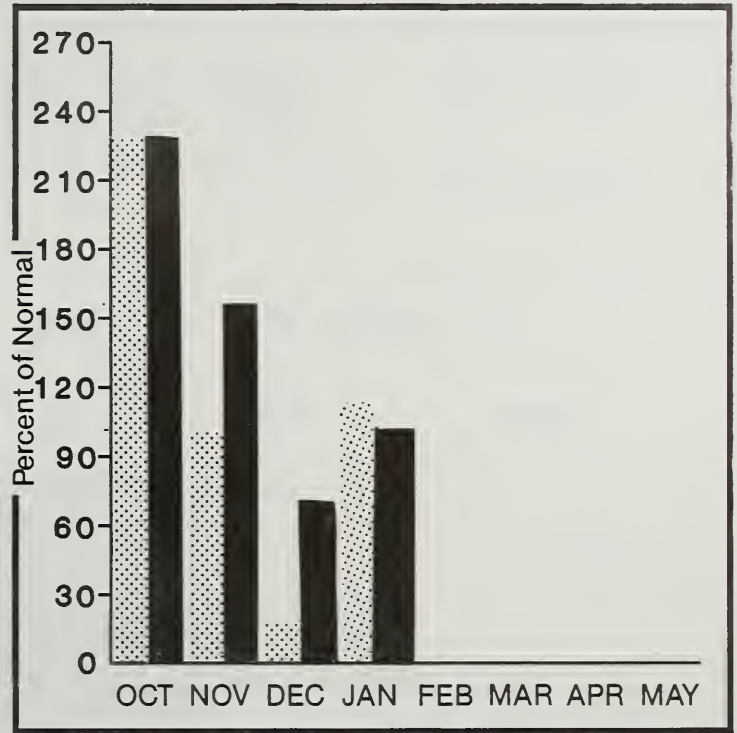
Minimum



Current



Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation



Year to date precipitation



NORTH PUGET SOUND RIVER BASINS

WATER SUPPLY OUTLOOK:

Snow cover improved in the Skagit Basin going from 78% for January 1st to 91% for February 1. Stream-flows are forecasted to be 87% of normal for the April-September period. Precipitation was 111% of normal for January bringing the water year total to 100%. Temperatures were 6 degrees above average for January. Some areas of local flooding occurred during the January 18 rain storm.

For more information contact your local Soil Conservation Service office.

NORTH PUGET SOUND RIVER BASINS

STREAMFLOW FORECASTS

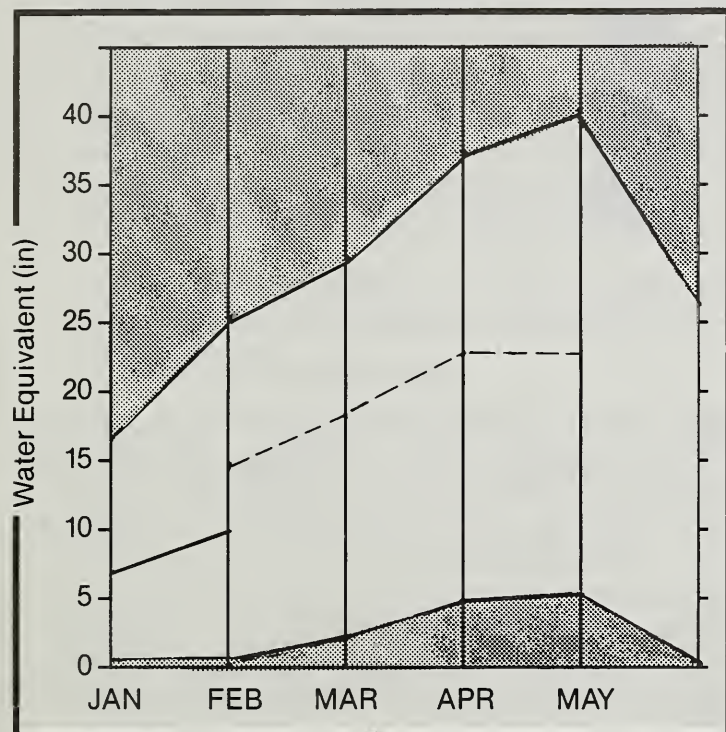
FORECAST POINT	FORECAST PERIOD	20 YR. AVE. (1000AF)	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVE.)	REAS. MAX. (% AVE.)	REAS. MIN. (% AVE.)	PEAK FLOW (CFS)	PEAK DATE	LOW FLOW (CFS)	LOW DATE
SKAGIT RIVER at Newhalem *	APR-SEP	2356.0	2070.0	87	110	66				
	APR-JUL	1972.0	1740.0	88	110	66				
	APR-JUN	1485.0	1300.0	87	110	66				

RESERVOIR STORAGE (1000AF)					WATERSHED SNOWPACK ANALYSIS			
RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE **			WATERSHED	NO. COURSES AVE.D	THIS YEAR AS % OF	
		THIS YEAR	LAST YEAR	AVE.			LAST YR.	AVERAGE
ROSS	1404.1	955.9	880.5	1023.9	Skagit River	13	105	90
DIABLO RESERVOIR	90.6	85.0	84.2	84.2	Baker River	0	0	0
GORGE RESERVOIR	9.8	7.9	8.1	7.9	Cedar River	0	0	0
					Snoqualmie River	0	0	0
					Skykomish River	2	71	72

*Corrected for upstream diversions or changes in reservoir storage.
Average is for 1961-80 period.

OLYMPIC

Mountain snowpack* (inches)

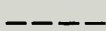


*Based on selected stations

Maximum



Average



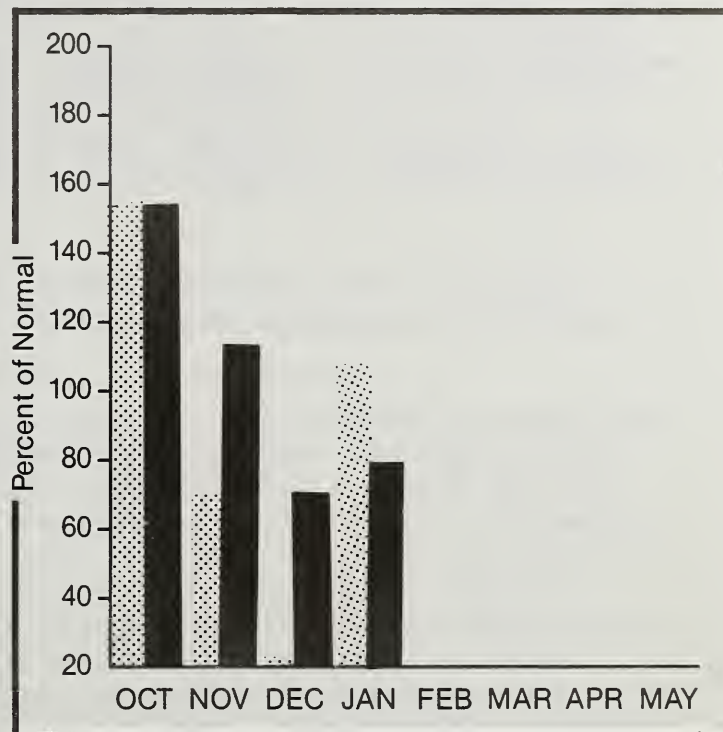
Minimum



Current



Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation



Year to date precipitation



OLYMPIC PENINSULA RIVER BASINS

WATER SUPPLY OUTLOOK:

Snow cover in the Olympic Basin remained much the same as the January report, with the Dungeness 75% and the Elwah 60% of normal. Forecasted streamflows are 78% on the Dungeness and 74% on the Elwah for the April-September period. Some local flooding occurred during the rainfall of January 18. Precipitation for January was 105% of normal, bringing the water year total to 79% of average. Temperatures for January were 6 degrees above normal.

For more information contact your local Soil Conservation Service office.

OLYMPIC PENINSULA RIVER BASINS

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	20 YR. AVE. (1000AF)	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVE.)	REAS. MAX. (% AVE.)	REAS. MIN. (% AVE.)	PEAK FLOW (CFS)	PEAK DATE	LOW FLOW (CFS)	LOW DATE
DUNGENESS RIVER nr Sequim	APR-SEP	160.0	125.0	78						
	APR-JUL	130.0	100.0	76						
	APR-JUN	97.0	76.0	78						
ELWHA RIVER nr Fort Angeles	APR-SEP	553.0	410.0	74						
	APR-JUL	454.0	340.0	74						

RESERVOIR STORAGE (1000AF)					WATERSHED SNOWPACK ANALYSIS			
RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVE.	WATERSHED	NO. COURSES AVE.D	THIS YEAR AS % OF LAST YR. AVERAGE	
					Dungeness River	1	71	75
					Morse Creek	1	91	88
					Elwha River	1	73	60

*Corrected for upstream diversions or changes in reservoir storage.
Average is for 1961-80 period.

SNOW SURVEYS

Water is the lifeblood of the West--the crucial commodity. The region's development from a thousand years ago to today has been tied to the availability of water.

Water supply varies greatly from season to season and from year to year, and water is often located great distances from where it is needed. Snowmelt from winter accumulations in the high mountains is the source of about 70 percent of the region's water supply. Typically, irrigators and communities collect, store, and transport water to regulate quantity and ensure availability when and where it is required. With about 40 million acres under irrigation, modern agriculture together with the pressures of a rapidly expanding society make heavy demands on this water.

Since the development of new supplies has become extremely costly and not feasible in many cases, conservation of existing water resources is critical to the West.

Early westerners realized the ties between the size of the winter snowpack in the high mountain ranges--Rockies, Cascades, Sierra Nevada--and their summer water supply. Some attempts to measure the snow and predict runoff had been made in the East as early as 1834, but it wasn't until 1904 that a systematic survey was undertaken in the West. Dr. James Church, a classics professor at the University of Nevada in Reno, made surveys on Mt. Rose in the Sierra Nevada. He developed measuring equipment and sampling techniques that led to the first water supply forecasts. Success in Nevada soon spread to other states and agencies. By 1935, at last nine independent snow surveys were being conducted.

Drought is a part of life in the West. In 1934, a particularly severe drought resulted in farmers demanding better predictions of the streamflows available for growing crops. Others who counted on water for industry, power generation, and domestic use echoed this request. Congress responded in 1935 by passing legislation creating a federal snow survey and water supply forecasting program under the direction of the Bureau of Agricultural Engineering in the Department of Agriculture. In 1939, the bureau was transferred to the Soil Conservation Service (SCS); this agency continues to direct a cooperative federal, state, and private snow survey program. The National Weather Service is a major cooperator with SCS in making these water supply forecasts. Today, forecasts are routinely issued for over 600 locations in the West.

Manual surveys, similar to those initiated by Dr. Church and performed by teams of trained surveyors, have been the backbone of the measurement network. With the advent of mechanized oversnow machines and aircraft, the surveyor's task has been eased somewhat, but snowshoes and skis are still required to reach many remote sites. Periodic measurements at some 1400 snow courses provide the insight into snowpack accumulation patterns. Forecasters still use this information advantageously, but more frequent data are needed to improve the accuracy and timeliness of forecasts. Various methods of remote data acquisition have been tested, including conventional line-of-sight radio telemetry, satellite based telemetry, and a new technique called meteor burst telemetry.

Meteor burst telemetry relies on the physical phenomenon that enables radio signals to be reflected off ionized meteorite trails 50-75 miles above the earth's surface. Utilizing this principle, sites as far apart as 1200 miles can communicate with one another for very short periods ranging from fractions of seconds up to several seconds. This interval is sufficiently long to "burst" relatively short data messages between sending and receiving stations. This method of communications is ideally suited for interrogating remote data sites on a schedule of several polls per day. The interference that mountains often cause in conventional communications is not a problem for a meteor burst system.

In 1977, SCS began modernizing its snow surveys by introducing meteor burst technology for acquiring snowpack data. The project, called SNOTEL (for SNOW TELEmetry) measures and transmits snowpack, precipitation, and temperature on a daily basis throughout the West. A snow pillow serves as a hydraulic weighting platform to measure the snow water content.

About 550 SNOTEL sites are in operation. Most sites are powered by solar panels and are visited only a few times each year. Data are transmitted daily by meteor burst to a master station in Boise, Idaho, or Ogden, Utah, and then automatically forwarded by telephone to a central computer in Portland, Oregon.

Hydrologic data gathered from the SNOTEL system, snow course network, and other climatological stations are assembled in the computer system at the West National Technical Center in Portland, Oregon, for analysis and interpretation. A series of computer programs, known collectively as the Centralized Forecasting System (CFS), is the analytical tool used to generate streamflow forecasts, data summaries, and narratives that describe the current water supply outlook. This information is made immediately available to over 300 SCS field offices and other interested users through dial-up telecommunications.

Water suppliers are no longer a mystery thanks to this systematic snowpack inventory and monitoring program and advanced computer technology. Managers are alerted early in the water year to expect normal flows, water shortages, or floods, and they can make plans while there is still time to take effective action. Snow surveys and water supply forecasting do not create water, but they do the next best thing: They provide the tools for conservation of this most precious of the West's resources. For more information on this program, contact your local conservation district or SCS office.

All programs and services of the USDA
are available to everyone without regard
to race, creed, color, sex, age, handicap
or national origin.

The Following Organizations Cooperate With The Soil Conservation Service In Snow Survey Work

Canada:

Ministry of the Environment, Water
Investigations Branch, Victoria, British Columbia

States:

Washington State Department of Ecology
Washington State Department of Natural Resources

Federal:

Department of the Army
Corps of Engineers
U.S. Department of Agriculture
Forest Service
U.S. Department of Commerce
NOAA, National Weather Service
U.S. Department of the Interior
Bonneville Power Administration
Bureau of Reclamation
Geological Survey
National Park Service

Local:

City of Tacoma
City of Seattle
Chelan County P.U.D.
Pacific Power and Light Company
Puget Sound Power and Light Company
Washington Water Power Company
Snohomish County P.U.D.

Private:

Okanogan Irrigation District
Wenatchee Heights Irrigation District
Newman Lake Homeowners Association

Other organizations and individuals furnish valuable information for snow survey reports. Their cooperation is gratefully acknowledged.

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